DETAILED ACTION

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statements filed on March 16, 2006 and June 23, 2006 have all been considered and made of record (note the attached copies of form PTO-1449).

Drawings

Seven (7) sheets of formal drawings were filed on March 16, 2006 and have been accepted by the Examiner.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S.

patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-4, 6-8, 11, 12, 14, 17, 18 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones (WO 03/102683 A1).

Regarding claims 1, 3, 4 and 17; Jones a bi-stable liquid crystal device (see the abstract and Figure 26) comprising:

- a first substrate (250) having thereon a first conductive layer (256, 258) and a first alignment layer (264);
- a second substrate (252) having thereon a second conductive layer (260, 262) and a second alignment layer (266);
- a liquid crystal layer (254) sandwiched between the first and second alignment layers;
- the first alignment layer inducing a first pre-tilt angle θ_1 in the range of 20^o-65^o between the liquid crystal layer in contact with the first alignment layer (see page 48, lines 11-17);
- said second alignment layer inducing a second pre-tilt angle θ_2 in the range of 20^o-65^o between the liquid crystal layer in contact with the second alignment layer (see page 48, lines 11-17);
- said liquid crystal layer being capable of maintaining a stable bend state or a stable splay state at zero bias voltage (see the abstract) and being switchable between the stable bend state

and the stable splay state when a switching energy is applied in operation to said liquid crystal layer (see the abstract and page 47, line 9, through page 49, line 2);

- wherein at least one of the first and second alignment layers comprises a mixture of vertical alignment material and horizontal alignment material;
- further comprising input and output polarizers (268).

Regarding claim 2; the bi-stable liquid crystal device disclosed by Jones comprises a liquid crystal having a positive dielectric birefringence when drive by electrical pulses at low frequency and a negative birefringence when driven by electrical pulses at high frequency.

Regarding claim 6; the pre-tilt angles on the pair of substrates are substantially different (see page 48, lines 15-17).

Regarding claim 7; the substrates (250, 252) have substantially parallel alignment directions (see figure 26, which shows that the substrates are orientated and aligned substantially parallel to each other).

Regarding claims 8, 11, 12, 14, 18 and 21; the switching energy is an electrical pulse generated by the first (256, 258) and second (260, 262) conductive layers that provides an electrical field in a predetermined direction between the pair of substrates to switch the liquid crystal layer between the bend state and the splay state. Each of the first and second conductive layers are formed of two patterned electrodes (256, 258 and 260, 262, respectively) that are

patterned into stripes that are substantially perpendicular in direction to each other to form an overlapping matrix of pixels (see Figure 26).

Claims 1, 2, 4, 5, 7-12 and 14-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Bryan-Brown et al. (US 2005/0062919 A1).

Regarding claims 1, 4, 5 and 17; Bryan-Brown et al. discloses a bi-stable liquid crystal device (see the title and paragraphs 53-59) comprising:

- a first substrate (3) having thereon a first conductive layer (strip like row electrodes, 6, form the conductive layer) and a first alignment layer (alignment grating; see paragraph 57);
- a second substrate (4) having thereon a second conductive layer (column electrodes, 7, form the conductive layer) and a second alignment layer (alignment grating; see paragraph 57);
- a liquid crystal layer (2) sandwiched between the first and second alignment layers;
- the first alignment layer inducing a first pre-tilt angle θ_1 in the range of 20^o-65^o between the liquid crystal layer in contact with the first alignment layer (see paragraph 64);
- said second alignment layer inducing a second pre-tilt angle θ_2 in the range of 20^o-65^o between the liquid crystal layer in contact with the second alignment layer (see paragraph 64);
- said liquid crystal layer being capable of maintaining a stable bend state or a stable splay state at zero bias voltage and being switchable between the stable bend state and the stable splay

state when a switching energy is applied in operation to said liquid crystal layer (see paragraphs 66-67);

- further comprising input and output polarizers (13, 13');
- wherein the polarizers respectively angle the alignment direction by ± 40° to ± 60° (see paragraph 68).

Regarding claim 2; the bi-stable liquid crystal device disclosed by Jones comprises a liquid crystal having a positive dielectric birefringence when drive by electrical pulses at low frequency and a negative birefringence when driven by electrical pulses at high frequency (see paragraph 74).

Regarding claim 7; the substrates (3, 4) have substantially parallel alignment directions (the substrates are orientated and aligned substantially parallel to each other).

Regarding claims 8-12, 14 and 18-22; the switching energy is an electrical pulse generated by the first (6) and second (7) conductive layers that provide an electrical field in a predetermined direction between the pair of substrates to switch the liquid crystal layer between the bend state and the splay state (see paragraphs 66-74). Each of the first and second conductive layers are formed of two patterned electrodes (strip and column electrodes, 6 and 7) that are patterned into stripes that are substantially perpendicular in direction to each other to form an overlapping matrix of pixels. The liquid crystal material may be a two-frequency material, wherein a low frequency electrical pulse aligns the liquid crystal layer in a bend state and a high frequency electrical pulse aligns the liquid crystal layer in a splay state (see paragraph 74).

Regarding claim 15; see paragraphs 2 and 53.

Regarding claim 16; although the conductive electrode layers are optically transparent to the wavelengths of interest, the layers reflect wavelengths outside the wavelength of interest and reflect some light at the boundary of the electrodes and neighboring material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones (WO 03/102683 A1).

Regarding claim 5; Jones does not explicitly state that the input and output polarizers (268) respectively angle the alignment direction by ± 40° to ± 60°. However, one of ordinary skill in the art would have found it obvious to have the input polarizers and the alignment direction at any desired angle to obtain the best output from the LCD, including ± 40° to ± 60°, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233), and that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Claims 13 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bryan-Brown et al. (US 2005/0062919 A1).

Regarding claim 13; Bryan-Brown et al. does not disclose that the patterned electrode has an interdigital structure, however, one of ordinary skill in the art would have found it obvious to provide patterned electrode with an interdigital structure to obtain the desired application of electrical signal to the liquid crystal in order to obtain the desired switching arrangement, As interdigital structured electrodes are known in the art.

Regarding claim 23; Bryan-Brown et al. does not specifically teach that the cell gap-birefringence product is 0.31±0.1μm, however, one of ordinary skill in the art would have found it obvious to have the cell gap-birefringence product be an optimized value, including 0.31±0.1μm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233), and that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Bryan-Brown et al. (US 2005/0062919 A1), Boller et al. (US 4,613,208), Hiroshima et al. (US 6,118,422), Berreman et al. (US 4,239,345) and Ohkubo et al. (US 4,878,742).

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (571) 272-2345. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (571) 272-1562.

/Michelle R. Connelly-Cushwa/
Patent Examiner
June 7, 2008